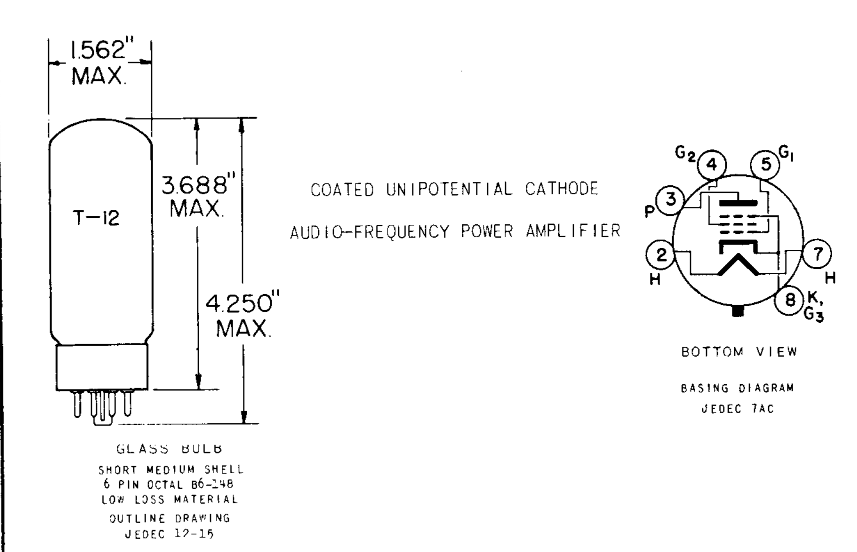
TUNG-SOL

BEAM-POWER PENTODE



THE 7581 IS A BEAM-POWER PENTODE PRIMARILY DESIGNED FOR USE IN AUDIO-FREQUENCY POWER-AMPLIFIER APPLICATIONS. THE TUBE IS A DIRECT REPLACEMENT FOR THE 6L6GC, BUT FEATURES ADDITIONAL CONTROLLED ZERO-BIAS CHARACTERISTICS AND A LOW-LOSS BASE.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.6	pf
INPUT	10	pf
OUTPUT	6.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	900	MA.
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION		6.3±0.6	VOLTS
HEATER-CATHODE VOLTAGE, MAX.			
HEATER POSITIVE WITH RESPECT TO CATHODE	200⊕	200●	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	200⊕	200●	VOLTS

⊕PENTODE CONNECTION.

●TRIODE CONNECTION.

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MAXIMUM RATINGS

→ DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

	PENTODE CON-NECTION	TRIODE[A] CON-NECTION	
PLATE VOLTAGE	500	450	VOLTS
SCREEN VOLTAGE	450[B]	---	VOLTS
PLATE DISSIPATION	30	---	WATTS
SCREEN DISSIPATION	5.0	---	WATTS
GRID #1 CIRCUIT RESISTANCE:			
WITH FIXED BIAS	0.1	0.1	MEGOHMS
WITH CATHODE BIAS	0.5	0.5	MEGOHMS

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS

PLATE VOLTAGE	70	250	VOLTS
SCREEN VOLTAGE	300	250	VOLTS
GRID #1 VOLTAGE	0[C]	-14	VOLTS
PEAK AF GRID #1 VOLTAGE	---	14	VOLTS
PLATE RESISTANCE, APPROX.	---	22500	OHMS
TRANSCONDUCTANCE	---	6000	MICROMHOS
PLATE CURRENT	210	72	MA.
SCREEN CURRENT	25	5.0	MA.

CLASS A_1 AMPLIFIER - TRIODE CONNECTION[A]

PLATE VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-20	VOLTS
PEAK AF GRID #1 VOLTAGE	20	VOLTS
AMPLIFICATION FACTOR	8	
PLATE RESISTANCE, APPROX.	1700	OHMS
TRANSCONDUCTANCE	4700	MICROMHOS
ZERO-SIGNAL PLATE CURRENT	40	MA.
MAXIMUM-SIGNAL PLATE CURRENT	44	MA.
LOAD RESISTANCE	5000	OHMS
TOTAL HARMONIC DISTORTION, APPROX.	5	PERCENT
MAXIMUM-SIGNAL POWER OUTPUT	1.4	WATTS

CLASS A_1 AMPLIFIER - PENTODE CONNECTION

PLATE VOLTAGE	250	300	350	VOLTS
SCREEN VOLTAGE	250	200	250	VOLTS
GRID #1 VOLTAGE	-14	-12.5	-18	VOLTS
PEAK AF GRID #1 VOLTAGE	14	12.5	18	VOLTS
PLATE RESISTANCE, APPROX.	22500	35000	33000	OHMS
TRANSCONDUCATANCE	6000	5300	5200	MICROMHOS
ZERO-SIGNAL PLATE CURRENT	72	48	54	MA.
MAX.-SIGNAL PLATE CURRENT	79	55	66	MA.
ZERO-SIGNAL SCREEN CURRENT	5.0	2.5	2.5	MA.
MAX.-SIGNAL SCREEN CURRENT	7.3	4.7	7.0	MA.
LOAD RESISTANCE	2500	4500	4200	OHMS
TOTAL HARMONIC DISTORTION, APPROX.	10	11	15	PERCENT
MAX.-SIGNAL POWER OUTPUT	6.5	6.5	10.8	WATTS

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→ INDICATES A CHANGE.

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TYPICAL OPERATING CHARACTERISTICS - CONT'D.

PUSH-PULL CLASS A_1 AMPLIFIER - VALUES FOR TWO TUBES

PLATE VOLTAGE	250	270	VOLTS
SCREEN VOLTAGE	250	270	VOLTS
GRID #1 VOLTAGE	-16	-17.5	VOLTS
PEAK AF GRID-TO-GRID VOLTAGE	32	35	VOLTS
ZERO-SIGNAL PLATE CURRENT	120	134	MA.
MAX.-SIGNAL PLATE CURRENT	140	155	MA.
ZERO-SIGNAL SCREEN CURRENT	10	11	MA.
MAX.-SIGNAL SCREEN CURRENT	16	17	MA.
EFFECTIVE LOAD RESISTANCE, PLATE-TO-PLATE	5000	5000	OHMS
TOTAL HARMONIC DISTORTION	2	2	PERCENT
MAX.-SIGNAL POWER OUTPUT	14.5	17.5	WATTS

PUSH-PULL CLASS AB_1 AMPLIFIER - VALUES FOR TWO TUBES

PLATE VOLTAGE	360	360	450	VOLTS
SCREEN VOLTAGE	270	270	400	VOLTS
GRID #1 VOLTAGE	-22.5	-22.5	-37	VOLTS
PEAK AF GRID-TO-GRID VOLTAGE	45	45	70	VOLTS
ZERO-SIGNAL PLATE CURRENT	88	88	116	MA.
MAX.-SIGNAL PLATE CURRENT	132	140	210	MA.
ZERO-SIGNAL SCREEN CURRENT	5.0	5.0	5.6	MA.
MAX.-SIGNAL SCREEN CURRENT	15	11	22	MA.
EFFECTIVE LOAD RESISTANCE, PLATE-TO-PLATE	6600	3800	5600	OHMS
TOTAL HARMONIC DISTORTION	2	2	1.8	PERCENT
MAX.-SIGNAL POWER OUTPUT	26.5	18	55	WATTS

PUSH-PULL CLASS AB_2 AMPLIFIER - VALUES FOR TWO TUBES

PLATE VOLTAGE	360	360	VOLTS
SCREEN VOLTAGE	225	270	VOLTS
GRID #1 VOLTAGE	-18	-22.5	VOLTS
PEAK AF GRID-TO-GRID VOLTAGE	52	72	VOLTS
ZERO-SIGNAL PLATE CURRENT	78	88	MA.
MAX.-SIGNAL PLATE CURRENT	142	205	MA.
ZERO-SIGNAL SCREEN CURRENT	3.5	5.0	MA.
MAX.-SIGNAL SCREEN CURRENT	11	16	MA.
EFFECTIVE LOAD RESISTANCE, PLATE TO PLATE	6000	3800	OHMS
TOTAL HARMONIC DISTORTION	2	2	PERCENT
MAX.-SIGNAL POWER OUTPUT	31	47	WATTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

[A] WITH SCREEN CONNECTED TO PLATE.

[B] THE MAXIMUM SCREEN VOLTAGE RATING IS 500 VOLTS IN PUSH-PULL CIRCUITS WHERE THE SCREEN OF EACH TUBE IS CONNECTED TO A TAP ON THE PLATE WINDING OF THE OUTPUT TRANSFORMER.

[C] APPLIED FOR SHORT INTERVAL (TWO SECONDS MAXIMUM) SO AS NOT TO DAMAGE TUBE.

CONTINUED ON FOLLOWING.

7581
TRIODE CONNECTION
E_f = 6.3 Volts
SCREEN TIED TO PLATE

E_{c1} =0 Volts
+10
+5.0
-5.0
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60

E_{c1}=+10 Volts
+5.0

PLATE CURRENT (I_b) - MILLIAMPERES
0
25
50
75
100
125

PLATE VOLTAGE - VOLTS
0
100
200
300
400
500

7581
E_f = 6.3 Volts
E_{c2} = 250 Volts

E_{c1}= 0 V
-2.0
-4.0
-6.0
-8.0
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-32
-36
-40

PLATE CURRENT (ib) - MILLIAMPERES
0
50
100
150
200

PLATE VOLTS
0
100
200
300
400
500
600
700

7581
E_f = 6.3 Volts
E_{c2} = 250 Volts

SCREEN CURRENT - MILLIAMPERES

0, 10, 20, 30, 40

E_{c1} =0 V.
-8.0
-16
-24
-32

0, 100, 200, 300, 400, 500

PLATE VOLTS

7581
E_f = 6.3 Volts
E_{c2} = 250 Volts

PLATE CURRENT (I_b) - MILLIAMPERES

0, 100, 200, 300, 400, 500

E_{c1}=+20 Volts
+16
+12
+8.0
+4.0
0
-4.0
-8.0
-12
-16
-20
-24
-32
-40

0, 100, 200, 300, 400, 500, 600, 700

PLATE VOLTAGE - VOLTS

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TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A., JULY 1, 1961 PLATE #6214

7581
E_f = 6.3 Volts
E_{c2} = 250 Volts

E_{c1}=+20 V
+16
+12
+8.0
+4.0

GRID #1 CURRENT (I_{c1}) - MILLIAMPERES
0 10 20 30 40 50

0 100 200 300 400 500 600
PLATE VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_b = 250 Volts

E_{c2} = 250 Volts
200
150
100
50

PLATE CURRENT - MILLIAMPERES
0 50 100 150 200

-50 -40 -30 -20 -10 0
GRID #1 VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_b = 250 Volts

E_{c2} =250 Volts
200
150
100
50

15
10
5
0
SCREEN CURRENT - MILLIAMPERES

-50 -40 -30 -20 -10 0
GRID-#1 VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_{c1} = 0 Volts

E_{c2} =400 Volts
350
300
250
200
150
100
50

400
300
200
100
0
PLATE CURRENT - MILLIAMPERES

0 100 200 300 400 500 600 700
PLATE VOLTS

TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A., JULY 1, 1961 PLATE #6215

7581
E_f = 6.3 Volts
E_{c1} = 0 Volts

SCREEN CURRENT - MILLIAMPERES

PLATE VOLTAGE - VOLTS

E_{c2}=400 V
350
300
250
200
150
100
50

0 10 20 30 40 50
0 100 200 300 400 500 600 700

7581
E_f = 6.3 Volts
E_{c2} = 400 Volts

PLATE CURRENT (I_b) - MILLIAMPERES

PLATE VOLTAGE - VOLTS

+20
+16
+12
+8.0
+4.0
C_{c1}=0V
-4.0
-8.0
-12
-16
-20
-25
-30
-40
-50

0 250 500 750
0 250 500 750 1000

7581
E_f = 6.3 Volts
E_{c2} = 400 Volts

GRID #1 CURRENT (I_{c1}) - MILLIAMPERES

I_{c1} @ E_{c1} =+20
+16
+12
+8.0
+4.0

0, 10, 20, 30

0, 250, 500, 750, 1000

PLATE VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_{c2} = 400 Volts

PLATE CURRENT (Ib) - MILLIAMPERES

I_b @ E_{c1} =0V
-4.0
-8.0
-12
-16
-20
-25
-30
-35
-40
-45
-50
-60

0, 100, 200, 300, 400

0, 100, 200, 300, 400, 500, 600, 700

PLATE VOLTAGE - VOLTS

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7581
E_f = 6.3 Volts
E_{c2} = 400 Volts

SCREEN CURRENT (I_{c2}) - MILLIAMPERES

100
75
50
25
0

+20
+10
I_{c2}@E_{c1} =0 V.
-10
-20
-30
-40
-50

0 100 200 300 400 500

PLATE VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_b = 400 Volts

E_{c2} = 400 Volts
350
300
250

PLATE CURRENT - MILLIAMPERES

400
300
200
100
0

-70 -60 -50 -40 -30 -20 -10

GRID #1 VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_b = 400 Volts
E_{c2} = 400 Volts
350
300
250
40
30
20
10
0
SCREEN CURRENT - MILLIAMPERES
-70
-60
-50
-40
-30
-20
-10
0
GRID #1 VOLTAGE - VOLTS

7581
E_f = 6.3 Volts
E_b = 250 Volts
E_{c2} = 250 Volts
E_{c1} = -14 Volts
E_{sig}= 9.9 Volts (RMS)
PLATE CURRENT
POWER OUTPUT
DISTORTION
SCREEN CURRENT
POWER OUTPUT - WATTS
10
7.5
5.0
2.5
0
TOTAL HARMONIC DISTORTION - PERCENT
20
15
10
5
0
PLATE CURRENT - MILLIAMPERES
1.00
.75
.50
.25
0
SCREEN CURRENT - MILLIAMPERES
40
30
20
10
0
0
1000
2000
3000
4000
5000
LOAD RESISTANCE IN OHMS

7581
TWO TUBES PUSH-PULL
CLASS AB_1
E_f = 6.3 Volts
E_b = 450 Volts
E_{c2} = 400 Volts
E_{c1} = -37 Volts
R_L = 5600 Ohms

PLATE DISSIPATION RATING
PLATE DISSIPATION
POWER OUTPUT
SCREEN DISSIPATION RATING
SCREEN DISSIPATION
DISTORTION

TOTAL HARMONIC DISTORTION - PERCENT: 0, 2.5, 5.0, 7.5, 10.0
POWER OUTPUT - WATTS: 0, 20, 40, 60, 80
PLATE DISSIPATION - WATTS - PER TUBE: 0, 10, 20, 30, 40
SCREEN DISSIPATION - WATTS - PER TUBE: 0, 2.5, 5.0, 7.5, 10.0
PEAK INPUT SIGNAL GRID-TO-GRID: 0, 20, 40, 60, 80, 100